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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,607	10/23/2003	Tsuyoshi Maeda	117304	6772

25944 7590 08/10/2006

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EXAMINER

SCHECHTER, ANDREW M

ART UNIT	PAPER NUMBER
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2871

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/690,607

Applicant(s)

MAEDA, TSUYOSHI

Examiner

Andrew Schechter

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,7,15,18,21-23,29-31 and 34-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,7,15,18,21-23,29-31 and 34-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 3 May 2006 have been fully considered but they are not persuasive.

The applicant argues that *Yano* discloses a retardation plate for optical compensation with n_x and n_y close to each other, which would not be capable of converting linear polarized light into circular polarized light. The claimed retardation plate converts linear polarized light into circular polarized light (as amended), so the retardation plate of *Yano* would not satisfy the limitations of the recited invention.

This is not persuasive. The rejection is not based on substituting the retardation plate of *Yano* for the retardation plate in the primary reference; rather *Yano* is relied on to teach what range of thicknesswise retardation values is appropriate for the retardation plate in the primary reference. The primary reference *Jisaki*, for instance, explicitly discloses that its retardation plates convert linearly polarized light to circularly polarized light, and vice versa (as amended to the claims). As argued by the applicant, this requires a certain in-plane retardation, or difference between n_x and n_y ; if we simplify matters by setting $n_{y1} \approx n_{z1} \approx 0$ (making the biaxiality small), then the requirement is $d_1 \times n_{x1} \approx \lambda/4$, and since *Jisaki* further discloses the reflection region having a liquid crystal layer phase difference of $\lambda/4$, the recited inequalities in the claims would be met. The effect of a larger optical biaxiality, using non-zero values of n_y and n_z , is to achieve "a wide viewing angle through higher-grade compensation" [*Yano*,

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paragraph 0028], and it is here that the *Yano*'s teaching of the preferred values for out-of-plane or "thicknesswise" retardations is relied upon. To sum up, the primary references disclose retardations which convert linear polarizations to circular and which, in the limiting case of very small biaxiality, meet the recited claim limitations; when larger biaxiality is used in order to achieve "higher-grade compensation" for wide viewing angles, *Yano* teaches an appropriate range of thicknesswise retardations which closely overlaps the recited ranges. The following rejections are therefore appropriate.

Claim Objections

2. Claim 40 is objected to because of the following informalities: in the second-to-last line, " $x d1 0 \leq 0.75$ " should be $--x d1 \leq 0.75--$. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 7, 15, 18, 21-23, 29, 30, and 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Jisaki et al.*, U.S. Patent No. 6,753,939 in view of *Yano et al.*, U.S. Patent Publication No. 2002/0071070, in view of *Terashita et al.*, U.S. Patent No. 6,201,592.

Jisaki discloses [see Fig. 1, for instance] a liquid crystal display device comprising a liquid crystal layer [3] between a first substrate [1] and a second substrate [2], one dot [one pixel] including a reflective display region [5] and a transmissive display region [6], the liquid crystal layer include a nematic liquid crystal [see Fig. 2] having negative permittivity anisotropy oriented substantially perpendicularly to the substrates [col. 6, line 61 – col. 7, line 20], a first retardation film [8] and a first polarizer [10] disposed in this order on the outer side of the first substrate, a second retardation film [9], a second polarizer [11] and an illuminating device [12] being disposed in this order on the outer side of the second substrate, and at least one of the first retardation film and the second retardation film having optical biaxiality [col. 8, line 65]. *Jisaki* discloses that the polarizers linearly polarize light and the retardation films convert the linear polarized light to circularly polarized light [col. 8, lines 15-30, for instance].

Jisaki discloses optical biaxiality, but does not explicitly disclose that the sum $W1$ satisfies $0.5xRt \leq W1 \leq 0.75xRt$, and that $nx1 > ny1 > nz1$ and $nx2 > ny2 > nz2$, as recited in the last paragraph of claim 1.

On the first point, *Yano* discloses [see paragraph 0028, etc.] the use of retardation films satisfying $nx \approx ny > nz$, and teaches that such optical devices should have a sum $W1$ for their out-of-plane (thicknesswise) retardations satisfying $0.5xRt \leq W1 \leq 1.3xRt$, or more preferably $0.7xRt \leq W1 \leq 1.0xRt$, ranges which overlap the recited range. In such cases of overlapping ranges, a *prima facie* case of obviousness exists [see MPEP 2144.05]. It would have been obvious to one of ordinary skill in the art at the time of the invention to have the sum $W1$ within the recited range, motivated by the

teaching of *Yano* that this is preferred in order to achieve a wide viewing angle through higher-grade compensation [see paragraph 0028, etc.].

On the second point, *Yano* teaches this range in the context of retardation films which satisfy $n_x \approx n_y > n_z$ rather than $n_x > n_y > n_z$. First, in order to convert linear to circular polarized light as *Jisaki's* retardation films do, it is necessary to have an in-plane retardation difference, or $n_x > n_y$. Second, as far as the out-of-plane (thicknesswise) retardation is concerned, *Terashita* [col. 18, lines 20-55] is evidence that it is an art-recognized equivalent for retardation films to have either $n_x \approx n_y > n_z$ or $n_x > n_y > n_z$, with either providing compensation for the viewing angle dependency problem. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use retardation films with $n_x > n_y > n_z$ and the recited retardation ranges, motivated by the desire to have appropriate in-plane retardation (for conversion of the light polarization) and out-of-plane retardation (for higher-grade compensation for viewing angle dependence).

Claim 1 is therefore unpatentable.

Both retardation films may be biaxial [col. 8, line 65], so claim 2 is also unpatentable. The retardation values (or equivalently phase differences) of the two retardation films are equal [col. 8, lines 50-54, for instance], so claim 15 is also unpatentable. The retardation films are $\lambda/4$ plates in the visible wavelength range [for instance at 550 nm, where the phase difference would be 138 nm], so the retardation values are between 100 nm and 160 nm, so claim 18 is also unpatentable.

The thickness of the liquid crystal layer in the reflective display region is smaller than the thickness in the transmissive region [see Fig. 1], so claim 7 is also unpatentable. The retardation films are $\lambda/4$ plates in the visible wavelength range, so $R(450) / R(590)$ is smaller than 1, so claim 21 is also unpatentable. The polarizers are orthogonal [col. 8, lines 30-31], so claim 22 is also unpatentable. The phase difference values of the first and second retardation film are substantially equal [col. 8, lines 50-54], so claim 23 is also unpatentable. There is a reflection layer [25], having an irregular configuration for performing scattered reflection [see Fig. 4], so claims 29 and 30 are unpatentable. There is a protuberance [13] formed on an electrode formed on the inner surface of one of the substrates, adjacent the liquid crystal, so claim 35 is also unpatentable. There can instead be an electrode having an opening [50, see Fig. 16] to drive the liquid crystal, on the inner surface of one of the substrates, adjacent the liquid crystal, so claim 34 is also unpatentable. There are at least two liquid crystal directors in one dot [pixel] when the liquid crystal is driven by an electrode [see Fig. 2], so claim 36 is also unpatentable. This is electronic equipment, so claim 37 is also unpatentable.

Claims 38 and 39 differ in reciting that the retardation of the first film satisfies $0.5 \times R_r \leq \text{Ret\#1} \leq 0.75 \times R_r$, where R_r is the retardation in the reflective region. Since the reflection region has thickness d in *Jisaki* and the transmissive region has thickness $2d$, the retardation in the reflection region is half that in the transmissive region, so we have $R_r = \frac{1}{2} R_t$. We also have $\text{Ret\#1} = \frac{1}{2} W_1$. This means that $0.5 \times R_t \leq W_1 \leq 0.75 \times R_t$ is equivalent to $0.5 \times R_r \leq \text{Ret\#1} \leq 0.75 \times R_r$ for the transflective device of *Jisaki*, so this limitation is met as discussed above, and claims 38 and 39 are also unpatentable. The

same limitation is recited in claims 40 and 41, so claims 40 and 41 are also unpatentable.

5. Claims 1, 2, 22, 29-31, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kubo et al.*, US 2001/0055082 in view of *Jisaki et al.*, U.S. Patent No. 6,753,939 in view of *Yano et al.*, U.S. Patent Publication No. 2002/0071070, in view of *Terashita et al.*, U.S. Patent No. 6,201,592.

Kubo discloses [see Figs. 13 and 15, for instance] a liquid crystal display device comprising a liquid crystal layer [5] between substrates, with reflective and transmissive display regions, nematic liquid crystal having negative permittivity anisotropy oriented substantially perpendicularly [see Fig. 15 and discussion thereof], a first retardation film [7] and first polarizer [6] in this order, a second retardation film [10] and a second polarizer [9], and an illuminating device [see Fig. 13] in this order. The retardation plates convert linear to circular polarization [see paragraph 0027, for instance].

Kubo does not disclose that at least one of the retardation films has optical biaxiality; it appears that the retardation films are both uniaxial. *Jisaki* discloses, for an analogous device, using either uniaxial or biaxial retardation films [col. 8, lines 64-65]. This is evidence that optical uniaxiality and biaxiality are considered art-recognized equivalents in this specific context; it would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use biaxial films in the device of *Kubo*, motivated by the art-recognized equivalence of the two. Satisfying the additional limitation regarding $n_x > n_y > n_z$ and $W1$ would have been obvious to one of ordinary skill in the art at the time of the invention in view of *Yano* and *Terashita* as discussed above.

Claims 1 and 2 are therefore unpatentable.

Kubo discloses crossed polarizers, so claim 22 is also unpatentable. *Kubo* discloses an irregular reflection layer, so claims 29 and 30 are also unpatentable. *Kubo* discloses that that the retardation films are orthogonal to each other in the X-axis direction, and form 45° angles with respect to the polarizers [see Fig. 15], so claim 31 is also unpatentable. *Kubo* discloses electronic equipment, so claim 37 is also unpatentable.

Conclusion


6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Nelms can be reached at (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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5 August 2006